

NAVAL POSTGRADUATE SCHOOL MONTEREY, CALIFORNIA



THESIS

19960402 143

**RISK MITIGATION TECHNIQUES EMPLOYED IN THE
REMEDATION CONTRACTING PROCESS FOR THE
ENVIRONMENTAL CLEANUP OF FORT ORD, CALIFORNIA**

by

Robert W. Schumitz

December 1995

Principal Advisor:

Sandra M. Desbrow

Approved for public release; distribution is unlimited

DEU QUALITY INSPECTED 1

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave Blank)		2. REPORT DATE December 1995		3. REPORT TYPE AND DATES COVERED Master's Thesis
4. TITLE AND SUBTITLE Risk Mitigation Techniques Employed in the Remediation Contracting Process for the Environmental Cleanup of Fort Ord, California				5. FUNDING NUMBERS
6. AUTHOR(S) Robert W. Schumitz				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey CA 93943-5000				8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSORING/MONITORING AGENCY REPORT NUMBER
11. SUPPLEMENTARY The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.				12b. DISTRIBUTION CODE
13. ABSTRACT (maximum 200 words) The remediation contracting process for Hazardous, Toxic, and Radiological Wastes (HTRW) is inherently risky. The Government must mitigate cost, schedule, and performance risks that are a result of HTRW complexities. When Fort Ord, California, was designated for closure in 1991 by the Base Realignment and Closure (BRAC) Commission, the U.S. Army became responsible for the total remediation of Fort Ord's properties. The effort represents a large-scale, complex remediation project to remove both surface and sub-surface hazardous and toxic wastes. The U.S. Army Corps of Engineers (Corps), Sacramento District is in charge of Fort Ord's ultimate cleanup. The Corps is using the Total Environmental Restoration Contracts (TERC) method as the principal tool to facilitate the required remediation. This thesis identifies and analyzes the risk mitigation efforts, from acquisition planning through contract administration, employed by the Corps in its contracting efforts. The objective of this thesis is to identify the unique risk mitigation strengths and weaknesses of the Corps' efforts and to recommend future risk mitigation efforts for large-scale HTRW remediation efforts.				
14. SUBJECT TERMS Risk mitigation, TERC, Environmental contracting				15. NUMBER OF PAGES *97
				16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified		18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified		19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified
				20. LIMITATION OF ABSTRACT UL

Approved for public release; distribution is unlimited

**RISK MITIGATION TECHNIQUES EMPLOYED IN THE REMEDIATION
CONTRACTING PROCESS FOR THE ENVIRONMENTAL CLEANUP OF
FORT ORD, CALIFORNIA**

Robert W. Schumitz
Captain, United States Army
B.A., Syracuse University, 1985

Submitted in partial fulfillment
of the requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

**NAVAL POSTGRADUATE SCHOOL
DECEMBER 1995**

Author: Robert W. Schumitz
Robert W. Schumitz

Approved by: Sandra M. Desbrow
Sandra M. Desbrow, Advisor

David F. Matthews
David F. Matthews, Associate Advisor

Reuben T. Harris
Reuben T. Harris, Chairman
Department of Systems Management

ABSTRACT

The remediation contracting process for Hazardous, Toxic, and Radiological Wastes (HTRW) is inherently risky. The Government must mitigate cost, schedule, and performance risks that are a result of HTRW complexities. When Fort Ord, California, was designated for closure in 1991 by the Base Realignment and Closure (BRAC) Commission, the U.S. Army became responsible for the total remediation of Fort Ord's properties. The effort represents a large-scale, complex remediation project to remove both surface and sub-surface hazardous and toxic wastes. The U.S. Army Corps of Engineers (Corps), Sacramento District is in charge of Fort Ord's ultimate cleanup. The Corps is using the Total Environmental Restoration Contracts (TERC) method as the principal tool to facilitate the required remediation. This thesis identifies and analyzes the risk mitigation efforts, from acquisition planning through contract administration, employed by the Corps in its contracting efforts. The objective of this thesis is to identify the unique risk mitigation strengths and weaknesses of the Corps' efforts and to recommend future risk mitigation efforts for large-scale HTRW remediation efforts.

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	PURPOSE.....	1
B.	BACKGROUND.....	1
1.	Environmental Cleanup Required at Fort Ord...	1
2.	Restoration Contracting Method in use at Fort Ord.....	2
3.	Traditional Restoration Contracting Methods..	5
4.	Risk Mitigation.....	6
C.	THESIS OBJECTIVE.....	7
D.	METHODOLOGY.....	7
E.	RESEARCH QUESTIONS.....	8
1.	Primary Question.....	8
2.	Subsidiary Questions.....	8
F.	SUMMARY.....	9
II.	RESTORATION REQUIREMENTS ASSOCIATED WITH FORT ORD....	11
A.	RESTORATION EFFORTS AT FORT ORD TO DATE.....	11
B.	REMAINING REMEDIATION REQUIREMENTS ON FORT ORD...	13
C.	BRAC ISSUES CONCERNING FORT ORD'S RESTORATION....	15
D.	CRITICAL LAWS THAT AFFECT THE REMEDIATION PROCESS.....	16
1.	The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA)	18

2.	The Resource Conservation and Recovery Act of 1976 (RCRA).....	20
3.	The Federal Facilities Compliance Act of 1992 (FFCA).....	20
4.	The National Environmental Policy Act of 1969 (NEPA).....	21
5.	The Community Environmental Response Facilitation Act of 1992 (CERFA).....	21
6.	California Laws Applicable to Fort Ord's Environmental Restoration.....	22
E.	SUMMARY.....	23
III.	TERC CONTRACTING.....	25
A.	GENERAL ASPECTS OF THE TERC.....	25
B.	ACQUISITION PLANNING.....	26
C.	THE TERC REQUEST FOR PROPOSALS (RFP).....	30
D.	SOURCE SELECTION CRITERIA.....	32
1.	Volume I: Business, Management and Technical Approach.....	33
2.	Volume II: Experience, Organization and Personnel.....	34
3.	Volume III: Operational Management Plan.....	34
4.	Volume IV: Acquisition Management Plan.....	35
5.	Volume V: Cost.....	35
6.	Volume VI: Sample Project.....	36

E.	CONTRACT TYPE.....	37
1.	Completion Form.....	39
2.	Term Form.....	39
F.	CONTRACT ADMINISTRATION.....	40
1.	Management Plan.....	40
2.	Work Plan Development.....	41
3.	On-Site Management.....	42
4.	Partnering.....	43
G.	THE APPLICATION OF REMEDIATION CONTRACTING LESSONS-LEARNED.....	44
H.	SUMMARY.....	46
IV.	ANALYSIS.....	47
A.	GENERAL.....	47
B.	PRE-AWARD RISK MITIGATION.....	47
1.	Consistency in Application.....	47
2.	TERC Benefits.....	49
3.	Contracting for Unexploded Ordnance (UXO) Remediation.....	53
B.	RISK MITIGATION IN THE SOLICITATION AND AWARD PHASES.....	55
1.	The Sample Project Required by the RFP.....	55
2.	Using a Single Delivery Order per Remediation Site.....	56

C.	RISK MITIGATION EFFORTS IN THE CONTRACT	
	ADMINISTRATION PHASE.....	58
1.	Remediation Design Approval.....	58
2.	Partnering.....	61
3.	Cost Contract Administration Training.....	63
E.	SUMMARY.....	66
V.	CONCLUSIONS AND RECOMMENDATIONS.....	67
A.	ANSWERS TO RESEARCH QUESTIONS.....	67
1.	Primary Question.....	67
2.	Subsidiary Question 1.....	68
3.	Subsidiary Question 2.....	69
4.	Subsidiary Question 3.....	70
B.	CONCLUSIONS.....	70
1.	General.....	70
2.	Risk Mitigation Efforts Facilitated by the Corps.....	71
3.	Required Improvements.....	74
C.	RECOMMENDATIONS.....	75
D.	FURTHER RESEARCH.....	76
	LIST OF REFERENCES.....	79
	INITIAL DISTRIBUTION LIST.....	83

LIST OF FIGURES

1. Superfund Cleanup Process.....4
2. Cumulative Number of Federal Environmental Laws
and Amendments.....17

I. INTRODUCTION

A. PURPOSE

This thesis was pursued in order to investigate the efforts taken by the Government to reduce cost, schedule, and performance risks associated with the contracting effort for the environmental cleanup and restoration of Fort Ord, California.

B. BACKGROUND

The Department of Defense (DoD) generates more than 500,000 tons of hazardous waste each year. Currently, there are "ninety-four active locations and fifteen former defense sites on the U.S. Environmental Protection Agency's Superfund National Priorities List (NPL) of most contaminated sites." (Goodman, 1994) Fort Ord, California is one of those sites.

1. Environmental Cleanup Required at Fort Ord

Fort Ord was the first major U.S. Army continental-based training installation (44 square miles in area) designated for closure by the Base Realignment and Closure Commission (BRAC) in 1991. Fort Ord's selection for closure

and the ultimate that will transpire will mandate the environmental cleanup and restoration of identified hazardous, toxic, and radiological waste (HTRW) sites on the installation. Nine thousand acres of the installation's property need remedial efforts. Remedial efforts required include the elimination of surface and subsurface contamination by ordnance, petroleum, and pesticide pollutants; land fill capping; and the cleansing of underground water plumes.

2. Restoration Contracting Method in use at Fort Ord

The Army Corps of Engineers (the Corps), Sacramento District, is the lead agency in supervising and contracting for all aspects of the environmental restoration of Fort Ord, except for the cleanup of unexploded ordnance. The contract for the remediation of unexploded ordnance is the responsibility of the Ordnance Response Mandatory Center of Excellence, which is located at the Corps of Engineers Huntsville, Alabama Division.

The method of contracting that the Corps is using for the portion of Fort Ord's remediation that contains those sites both on the NPL and others, is called the Total Environmental Restoration Contract (TERC). The TERC is an evolutionary method of contracting which was only approved

for use in September 1993. The TERC is designed to improve upon the previously used methods of contracting for environmental remediation of HTRW sites. The TERC's principal purpose is to provide a tool which enables remedial activities to be conducted concurrently, as opposed to a lock step sequencing of activities, thus providing increased flexibility in remediation efforts which has not been afforded by other contracting methods. It is not the only contracting method available for the cleanup efforts and, in fact, it is best suited for select situations which are high-priority and time-sensitive, such as BRAC installations. (USACE, 1993)

This method provides the Corps with a full-service contractual agreement that allows a single contractor, selected via a formal source selection process, to carry an HTRW remediation effort through all six Superfund cleanup phases (Figure 1).

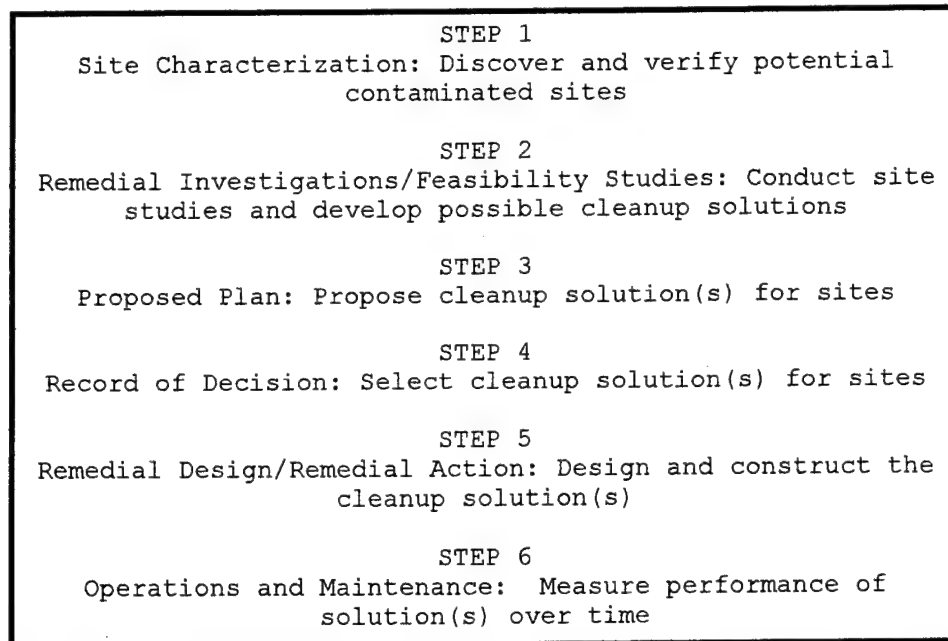


Figure 1. Superfund Cleanup Process (Advance, 1993)

The TERC is an indefinite delivery/indefinite quantity type of contract. Under the TERC, each major project is negotiated as a separate delivery order. For the TERC that includes the remediation of Fort Ord, there are four distinct delivery orders. The total value of the TERC being administered by the Corps' Sacramento District is \$180 million. The Fort Ord delivery order within that TERC is worth \$70 million or 40.2 percent of the total contract value. The other delivery orders within the TERC are for projects at the Presidio of San Francisco, Hamilton Army Airfield, both of which are located in California and Stead Air Force Base, which is a formerly used defense site in

Nevada. Each of the other delivery orders are worth 20.3, 38.3, and 1.2 percent respectively, of the total TERC value. (Lightner, 1995) The remediation requirements for Fort Ord provide a representative sample of what will be encountered at each of the other delivery order sites, as well as some of its own unique issues, i.e. ground water remediation and a large scale rifle range remediation project. (Lightner, 1995)

3. Traditional Restoration Contracting Methods

Traditional contracting methods have followed two principal courses of action. The first course of action would be to solicit a contract for each consecutive step of the Superfund Cleanup Process. The second course of action would be to have one contract and contractor for steps one through four and the remedial design portion of step five. A subsequent contract would follow providing for a contractor to perform the remedial action, in accordance with the design contractor's plan, and ultimately to operate and maintain the clean site as required. A derivative of the second course of action would be to have the first contract cover only steps one through four and the follow-up contract cover all aspects of steps five and six. (Heberling and Murphy, 1994)

4. Risk Mitigation

Risk is defined as "the probability of an undesirable event occurring and the significance of the consequence of the occurrence." (DSMC, 1989) The methods of dealing with risk are: avoidance, abatement, retention, and transfer. (Babchuk, 1992) The goal of the Government is to mitigate identified contractor and project risks, and to build the best contractual agreement possible to allocate those risks between the Government and the contractor.

Risk and uncertainty are inherent factors associated with environmental cleanup efforts. The vast majority of restoration efforts are subsurface, therefore, the estimate provided for the required cleanup is based solely upon site samples. Accordingly, the estimation is only a representation of what might actually be encountered once restoration efforts begin. In addition to risks associated with a given site, the Government and prime contractor must concern themselves with: compliance with the ever-changing Federal, state, and local environmental laws applicable to a given environmental restoration project; the waste generator's responsibility for hazardous waste from cradle to grave; and the risk of contractor or subcontractor default.

Given these uncertainties and risks, Government personnel must formulate a plan that controls risk and uncertainty throughout the contracting process, from requirements generation through contract administration.

C. THESIS OBJECTIVE

This thesis will document and analyze the risk mitigation efforts applied to the environmental cleanup process of Fort Ord by the Corps of Engineers, Sacramento District, throughout the contracting process, from requirements generation through contract administration. Steps for contracting remediation efforts at other installations requiring large scale environmental cleanup will be recommended. This thesis will focus solely on the TERC method of contracting and its application to Fort Ord's restoration.

D. METHODOLOGY

The research methodology used for the collection of information on this thesis subject included: interviews with representatives from both the U.S. Army Corps of Engineers (USACE), Sacramento District, and International Technology Corporation; a review of the USACE TERC Acquisition Plan,

the Sacramento District's TERC Acquisition Plan and TERC standard operating procedures; a review of the Request for Proposals (RFP), number DACW05-94-R-0001, which includes the remediation efforts associated with Fort Ord; and a review of current periodical information relating to environmental restoration efforts and environmental restoration contracting.

E. RESEARCH QUESTIONS

1. Primary Question

What efforts have been taken by the U.S. Army Corps of Engineers, Sacramento District, to mitigate the contracting risks associated with environmental restoration and hazardous waste disposal, for the environmental cleanup of Fort Ord, California?

2. Subsidiary Questions

a. How were lessons-learned from previous efforts incorporated into the TERC?

b. What are the critical Federal, California, and Monterey County environmental laws that apply to the restoration effort of Fort Ord?

c. What is the Corps' plan for administering the restoration of Fort Ord?

F. SUMMARY

Chapters II and III of this thesis discuss remediation efforts associated with Fort Ord, and the particulars of the TERC method of contracting. Included in Chapter IV is an analysis of risk mitigating efforts associated with the TERC contracting method, and the application of those efforts to the remediation of Fort Ord. Chapter V answers the thesis questions, both primary and subsidiary, and suggests further areas of research regarding environmental restoration efforts.

II. RESTORATION REQUIREMENTS ASSOCIATED WITH FORT ORD

A. RESTORATION EFFORTS AT FORT ORD TO DATE

Since 1985, approximately \$40 million has been spent on the environmental remediation/restoration process of Fort Ord, \$25 million of that total amount since September 1991. The principal expenditures have been to conduct preliminary investigations, remedial investigations, and remedial studies of suspected locations of hazardous waste on Fort Ord. The studies and investigations have been associated with the first two steps of the Environmental Protection Agency's Superfund cleanup process (Figure 1). The studies have been conducted under a contract awarded to Harding Lawson Associates (HLA). Other portions of the \$40 million have been spent on: groundwater remediation at Fritzsche Army Airfield; underground storage tank testing, retrofitting, and removal; remediation of well-defined surface contaminated areas; and well digging.

Harding Lawson Associates was under contract to perform investigative efforts that provide information critical to remediation design efforts. The contract was an architecture and engineering (A & E) services contract that precluded them from performing any associated construction

efforts (FAR pt.36, 1995). Other remediation contracts have been awarded as fixed-price type contracts, due to the well-defined nature of their requirements. Through February 1993, 247 underground storage tanks (principally used for the storage of petroleum products) were identified as requiring some action. Of those, 144 were removed and 15 were retrofitted with vapor recovery systems. (Info Pam, 1993) Since that time, in addition to the remaining 88 underground storage tanks, 15 more have been discovered. Of the total of 103, 48 have been removed or retrofitted for certification. (McMindes, 1995)

Neither HLA's services nor any other previously mentioned remediation efforts have been performed under the direction of the TERC. All TERC efforts at Fort Ord are based on the contract's award date of 10 February 1995.

The Fort Ord delivery order under the TERC was mobilized for construction in July 1995. Prior to July, and since contract award in February, all other TERC work was associated with the design effort for the various projects or work allocation documents (WAD) that make up the Fort Ord delivery order. Construction work has focused on meeting the requirements established in a June 1994 Record of Decision regarding ground water contamination. A Record of Decision documents the remedy to a contamination that has

been jointly selected by both the EPA and DoD, and includes both a plan for the remediation design, and certification that the remedy meets regulatory requirements (Hamer,1993). The Record of Decision for Fort Ord requires the construction, by 1 October 1995, of a fully operational pump and treatment facility for the treatment of ground water contamination associated with the landfill. The Corps and IT anticipate the project to be completed on time and that it will demonstrate its effectiveness on 1 November 1995. (McMindes, 1995)

B. REMAINING REMEDIATION REQUIREMENTS ON FORT ORD

Under the TERC, seven (beyond the ground water remediation WAD already in progress) WADs exist requiring construction remediation efforts. There are an additional seven WADs associated with the Fort Ord delivery order that relate to either remediation projects or the delivery order in general. The WAD activities include: planning, review, studies, modeling, design engineering, construction and technical oversight, project management, and project close-out.

In addition to the TERC work, there are interim action sites that are small-scale and well-defined projects. The

projects include removal or retrofitting of 55 underground storage tanks, asbestos and lead base paint removal, and soil remediation. (LaBranche, 1995) Soil remediation includes both digging and hauling activities as well as soil treatment activities. The well-defined nature of the projects outside the TERC lend themselves to the use of fixed-price indefinite delivery/indefinite order contracts.

Projects specifically associated with the TERC include: ground water remediation, land fill capping, lead and metals removal from the beach and range impact area, large-scale soil remediation projects associated with petroleum based pollutants from former maintenance areas and a landfill, and soil remediation of sites contaminated by volatile organic compounds, pesticides, and dioxins.

The Corps anticipates that all required remediation efforts will be either completed or in place and functioning by February 1999. Any remaining remediation efforts associated with the operations and maintenance of in-place remedial systems will fall under either one of the TERC's options or a new fixed-price type of contract. (McMindes, 1995)

C. BRAC ISSUES CONCERNING FORT ORD'S RESTORATION

The over-riding issue associated with the BRAC Commission's decision to close Fort Ord is the transfer of the installation's land to other activities. The ultimate land transfer will result in the installation's property going to other Federal agencies, to California agencies (such as the University of California system), to local communities, and to private entities. Fort Ord's closure and ultimate conversion has been a highly-politicized and very visible public issue since its BRAC selection in 1991.

Prior to the accomplishment of an actual land transfer to the respective acquiring party, numerous tasks must be accomplished. Those tasks include, but are not limited to, environmental clearance, safety clearance, real-estate documentation, infrastructure utility transfer, and, most importantly, an approved environmental impact statement (EIS). The EIS is critical to furthering intended plans for future use of the property. The EIS addresses not only the effects of the immediate actions being considered, but also the action's affect on surrounding areas. It is obvious that the Corps is intimately involved in the ultimate transfer of Fort Ord's property, given the requirement for environmental clearance. Funding for the environmental

remediation projects on Fort Ord is provided by the BRAC closure account.

Since the remediation process is critical to a parcel's ultimate clearance and transfer, communication between the Corps, the remediation contractors, and the installation or customer, is critical. In this three-party relationship the installation representatives deal with the external/political aspects of the land transfer process, while the Corps deals solely with the remediation aspects and the contractor's performance. The contractor receives its only guidance regarding the prioritization of the remediation work effort from the Corps' residency office on Fort Ord. The relationship between customer, Corps, and contractor has proven successful to this point in time.

D. CRITICAL LAWS THAT AFFECT THE REMEDIATION PROCESS

The Department of Defense no longer possesses sovereign immunity where all Federal, state, and local environmental cleanliness and health and human safety laws are concerned. The DoD and its activities are subject to the same criminal penalties and fines as private industry. According to Sherri Wasserman Goodman, the Deputy Under Secretary of Defense for Environmental Security:

The DoD goal is to achieve full and sustained compliance with all Federal, state, and local

legal requirements. Contributing to this challenge is the variety and scope of DoD installations and activities, and legal or regulatory deadlines that do not always coincide with DoD's budget cycle. (Goodman, 1994)

The number of Federal environmental cleanliness laws and health and human safety laws has grown exponentially during the last 20 years. Figure 2 illustrates that growth, yet does not reflect the similar growth in state and local laws. Of the list of pertinent environmental and health and human safety laws applicable to the cleanup of Fort Ord, those that are the most critical will be discussed.

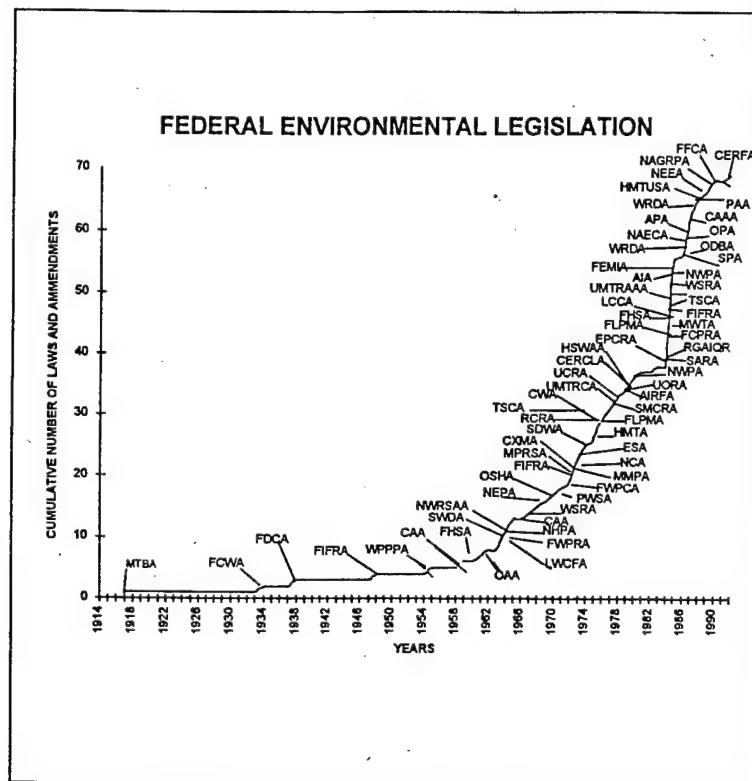


Figure 2. Cumulative Number of Federal Environmental Laws and Amendments. (U.S. Army, Environmental Office, 1994)

**1. The Comprehensive Environmental Response,
Compensation and Liability Act of 1980 (CERCLA)**

This statute, better known as the Superfund Act, covers the cleanup and restoration of HTRW sites that are closed or abandoned. To accommodate this responsibility, a trust fund (Superfund) was established. The Act authorizes the Government to take action in response to the release, or threat of release, of HTRW substances into the environment which may present an imminent danger to the public.

A critical aspect of CERCLA is that Section 120 of the Act requires compliance with all state and local environmental laws that apply to sites requiring remedial actions, other than those sites already on the NPL. The Environmental Protection Agency (EPA) listed Fort Ord as a Superfund site and included it on the NPL on 21 February 1990, on the basis of ground water contamination. In conjunction with its placement on the NPL, a Federal Facilities Agreement (FFA) was negotiated under Section 120 of CERCLA and became effective 19 November 1990. The agreement was negotiated between the U.S. Army, the EPA, The California Department of Health Services, and the California Regional Water Quality Control Board (CRWQCB), Central Coast

Region. The agreement provided that the Army would be the lead agency in the cleanup of Fort Ord.

The Superfund Act was updated and amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The amendment extended the life of CERCLA another four years until 30 September 1994. This amendment reinforced the requirement that Federal facilities must comply with both CERCLA and state environmental laws.

For active or previously-closed DoD installations, a separate fund, other than the Superfund, was established under SARA for environmental cleanup efforts. The new fund is the Defense Environmental Restoration Account (DERA). For BRAC installations, the BRAC account is in place for remedial efforts.

The Superfund Act, or CERCLA, was again amended in 1994, under the Superfund Reform Act. This portion of the entire Superfund package will have the most significant impact on the cleanup of Fort Ord. The Act provides for the consideration of plans for future reuse. According to Ms. Goodman:

DoD would provide remedies commensurate with the intended use. This is especially critical for the closing bases that may continue as industrial facilities or airfields.

The bill also provides broader consideration of cost in remedy selection; provides national cleanup standards for consistency while allowing the use of traditional risk assessment methods if no standards exist or DoD needs to tailor standards for specific conditions. (Goodman, 1994)

2. The Resource Conservation and Recovery Act of 1976

(RCRA)

This Act and its subsequent amendment, the Hazardous and Solid Waste Amendment of 1984, established an initiative to manage current and future hazardous waste operations. The RCRA picks up where CERCLA left off and establishes cradle-to-grave management responsibilities for hazardous waste generators. Responsibilities include record-keeping on generation, transportation, storage, and disposal of hazardous materials. (Hamer, 1993)

3. The Federal Facilities Compliance Act of 1992

(FFCA)

The FFCA reinforces what was already stated in CERCLA and its amendments, stating that Federal facilities are subject to the penalties and fines associated with Federal, state, and local environmental laws. Prior to this law, there was the feeling that DoD was hiding behind the interpretation of sovereign immunity to avoid fulfilling its

hazardous waste cleanup and management responsibilities.
(Hamer, 1993)

4. The National Environmental Policy Act of 1969 (NEPA)

As previously addressed, this law has particular application to the BRAC process associated with Fort Ord's ultimate reuse. The Act requires the preparation and performance of environmental assessments and an environmental impact statement, which considers current and future environmental implications of any given reuse plan, prior to execution of that plan. (HQ,AMC, 1994)

5. The Community Environmental Response Facilitation Act of 1992 (CERFA)

CERFA addresses both the rapid identification and restoration of contaminated areas, and the transfer of excess Government property. This Act is in response to the perceived economic hardships experienced by local communities after the closure of a facility, and the delay in ultimate property transfer due to the process of environmental remediation efforts. Under CERFA, DoD can release parcels of land that neither present environmental

hazards nor are considered a threat to health and human safety. The transfer of parcels can occur while remediation efforts are being performed at other sites on the installation. The transfer of Fort Ord property from the Army to the California University system is the perfect example of this law in effect.

6. California Laws Applicable to Fort Ord's Environmental Restoration

a. The Hazardous Waste Control Act (HCWA), of the California Health and Safety Code, provides the California EPA and the California Department of Toxic Substance Control, the authority to administer the state's hazardous waste program. The HCWA implements relevant Federal regulations such as RCRA. (USA, Ft. Ord, 1992)

b. AB 2948-Hazardous Waste: Management Plans and Facility Siting Law, addresses the involvement of counties in the management and oversight process of sites within their boundaries that have or generate hazardous wastes. (USA, Ft. Ord, 1992)

c. Title 22, Division 4, Chapter 30 of the California Code of Regulations (CCR) includes the implementing language and regulations that pertain to the management of hazardous substances. (USA, Ft. Ord, 1992)

d. Title 23, Chapters 3 and 16 of the CCR articulates the regulations regarding the construction and monitoring of new and used underground storage tanks. (USA, Ft. Ord, 1992)

E. SUMMARY

This chapter addressed both the environmental remediation requirements and the legal requirements that must be addressed by the Army, in order to proceed with the ultimate transfer of Fort Ord's property. The TERC method of contracting is the Corps' chosen contractual vehicle to meet these existing requirements.

III. TERC CONTRACTING

A. GENERAL ASPECTS OF THE TERC

The TERC is an indefinite delivery-indefinite quantity type of contract for the total remediation of sites/projects which are approved for remediation under the TERC umbrella. In order for a TERC to be awarded, it must have an anchor installation designated where a portion of the HTRW projects to be executed are located. The TERC, which includes Fort Ord's remediation, uses both Fort Ord and the Presidio of San Francisco as anchor installations. However, the TERC is not limited to use at only the anchor site(s). Projects that are deemed eligible to be performed under the TERC can be located anywhere within the awarding district's sphere of influence. For example the Sacramento TERC includes remediation efforts at both Stead Air Force Base and Hunter Army Airfield, and neither are listed as an anchor installation.

The anticipated value of any TERC is \$200 million for a period of performance, not to exceed ten years. TERCs that exceed 125 percent of the anticipated value require Department of the Army approval prior to award. (USACE, 1993) The total length of ten years is based upon a base period of

four years and two subsequent three-year options, if exercised. However, the minimum amount guaranteed is only \$200 thousand per period of contract issuance. The contract is performed in accordance with delivery orders which are negotiated and issued on a cost-reimbursement basis for each remediation project and its related tasks. The preferred methods of cost-reimbursement are via cost-plus-fixed-fee (CPFF) or cost-plus-award-fee (CPAF). A cost-plus-incentive-fee (CPIF) arrangement can be used only on a by-exception approval basis.

B. ACQUISITION PLANNING

The TERC is a specific contracting method that is not appropriate for all remediation projects. Therefore, the use of this contracting method is tightly controlled both at the Corps' district level and then again at the Corps' headquarters level where the ultimate use of a TERC is reviewed at each step of the decision process.

Prior to selecting the TERC method of contracting, the proposed project must go through a screening process. As the proposed project flows through the process it is screened by Corps representatives who determine if the project's requirements meet the criteria for TERC usage. If

the project is considered a valid candidate, it is then reviewed at the next higher echelon to determine if the responsible district office of the Corps has the available resources (trained staffing, funding, customer commitment, etc.) to execute a TERC.

At least one of the following elements, as dictated in the Corps Management Plan for TERC use, must exist at an HTRW site and be included in the district's need statement, prior to the decision to use a TERC:

1. The project is made up of two or more sites.
2. Project conditions indicate a high probability that interim remediation of point sources of contamination will be required.
3. Pre-remediation and remediation activity require significant interface and coordination .
4. Close coordination of remediation effort must be maintained between sites.
5. Pre-remediation activity between sites require critical interface.
6. Project funding is phased by site (operable unit).
7. Management of more than one contractor on an installation presents unacceptable administration problems in such areas as coordination and movement of work forces and equipment, separation and acceptance of contractor

responsibility, and verification of performance and progress.

8. Project conditions indicate there will be a need for the contractor to respond quickly to situations without interference from another contractor working in close proximity to the site. (USACE, 1993)

Additionally, the proposed project(s) for which a TERC will be considered must include both design and remedial action efforts. Once an installation is approved for remediation under a TERC, no remediation work, except that which is under existing contracts, should be performed outside the TERC. (USACE, 1993)

Tied to the tight control of TERC usage is the mandatory training on TERC background and implementation that key administrative representatives of the Corps must undergo prior to their involvement in the TERC selection, award, and administration processes. Once this training has been completed, it is the Corps' intent to maintain a consistent approach in the management of the TERC. In order to achieve, the desired consistency, the TERC Management Plan calls for the assignment of the project manager for the life of the contract and for key members of the TERC team to

retain their TERC responsibilities for extended periods.
(USACE, 1993)

Traditionally, the issues of HTRW liability, cash flow and capital investment, and project complexity, have been deterrents to the involvement of small businesses (SB) and small disadvantaged businesses (SDB) in HTRW remediation projects. The TERC encourages the chosen prime contractor to aggressively pursue the involvement of SBs and SDBs as subcontractors for the HTRW projects at hand. For instance, the TERC which includes the restoration of Fort Ord has a SB/SDB usage goal of 50 percent.

The TERC management plan provides the issuing district the opportunity to provide contractual incentives to the prime contractor for the increased involvement of SB/SDB in HTRW contracting either as subcontractors or through partnering (the TERC for Fort Ord does not use the incentive program). Between the incentives program to the prime for SB/SDB involvement, and that the traditional barriers to SB/SDB involvement are covered by the prime, SB/SDB involvement in HTRW contracting is nurtured via the TERC.

Funding for DoD remediation projects under the TERC comes from either the Defense Environmental Restoration Account (DERA) or the BRAC account. The DERA account covers both active installations and formerly used defense sites,

while the BRAC account solely covers remediation work at BRAC installations. If any other agency (non-DoD) requires remediation under the TERC, it is performed by using either that agency's operations and maintenance funds or the Superfund.

Ultimately, the Principle Assistant for Contracting (PARC) for the Corps retains contracting oversight responsibility for all TERCs and must approve all TERC acquisition plans, Commerce Business Daily (CBD) announcements, and requests for proposal (RFP) prior to release. This level of oversight ensures that there will be no deviations from the Corps' TERC acquisition plan, or that deviations are warranted and do not alter the integrity of the TERC.

C. THE TERC REQUEST FOR PROPOSALS (RFP)

All of the Corps' districts with TERC contracting authority must adhere to this Corps standard TERC RFP format. The standard format ensures a consistent approach by each district as contracts are solicited for HTRW remediation efforts. Deviations from the standard RFP, other than those that are district-specific, must be approved by the PARC.

Each solicitation must articulate every type of work effort that is anticipated to be required for successful contract performance. The RFP can therefore include every aspect of remediation work that is needed to meet the requirements of the six-step Superfund cleanup process (Figure 1). Work efforts can include HTRW investigations, predesign and design efforts, remedial construction, and operations and maintenance activities associated with a remedial solution. The solicitation must also address: the boundaries of the contract (generally the district's sphere of influence), the location of known project sites, and the potential for requiring the contractor to perform remedial efforts at sites other than those listed in the RFP.

In addition, the TERC solicitation requires the performance of a sample project by any contractor who submits a bid. The project is unique to each new solicitation and represents situations that may well be encountered while performing the actual contract. The project included in the RFP for the Fort Ord TERC contained the requirement to develop a plan to perform all remedial work, covering all six remediation phases: site investigation through operations and maintenance, at an Army NPL site in California. The sample site had requirements for both soil and water remediation.

Performance bonding is an HTRW remediation issue addressed within the TERC solicitation. Under the terms of the TERC contractual agreement, and in compliance with the Defense Federal Acquisition Regulation Supplement (DFARS) Part 228.102-1(4)(a), performance and payment bonds for a contractor performing under a cost-reimbursement contract, are not required. This is because the contractor is only required to provide its best efforts. However, subcontractors, performing construction activities over \$25 thousand in value, are required to be bonded whether they are performing under a cost-reimbursement or fixed-type arrangement.

D. SOURCE SELECTION CRITERIA

The goal of the source selection process is to select, via a competitive negotiation, the contractor who presents a proposal offering the best value to the Government. For the TERC, best value is determined by the evaluation of each offeror's proposal on the basis of its technical approach and cost realism, reasonableness, affordability, and a hypothetical project. The hypothetical project itself is evaluated on all of the same criteria. The evaluation criteria within the standard TERC RFP are broken into six sections or volumes, which cover the following subject

areas: Volume I, Business, Management and Technical Approach; Volume II, Experience, Organization and Personnel; Volume III, Operational Management Plan; Volume IV, Acquisition Management Plan; Volume V, Cost; Volume VI, Sample Project.

1. Volume I: Business, Management and Technical Approach

This section covers the offeror's corporate structure, its current commitments beyond the contract in question, and its financial management policies and procedures. Also included in this volume is the company's assessment of its own capabilities. This section includes explanations of the company's efficient utilization and balance of resources, the depth and size of the company, the company's ability to respond and mobilize to meet requirements, and any patented or innovative remediation technologies it possesses or uses.

The final aspect of this volume is the company's explanation of its business teaming relationships. This section addresses the company's anticipated approach to the use of both small businesses (SB) and small disadvantaged businesses (SDB) in the remediation process. Also, the company's use of other businesses beyond SBs and SDBs, which

will allow it to achieve the cradle to grave responsibilities of the given contract, must be addressed. (USACE,SD,RFP, 1993)

2. Volume II: Experience, Organization and Personnel

As stated, this section deals with the organization's experience. Topics that must be addressed include previous HTRW projects that the firm has successfully completed, as well as other types of projects which include design, construction, and related types of work which have been successfully completed. The proposal must address in this section the experience the firm and its personnel have with Government regulators and regulations. Finally, the company must address its compliance with HTRW health and safety requirements. (USACE,SD,RFP, 1993)

3. Volume III: Operational Management Plan

This section addresses the company's overall management plan, to include: its use of a management information system for project management and cost control; its contractor quality control plan; and its chemical quality management plan. (USACE,SD,RFP, 1993)

4. Volume IV: Acquisition Management Plan

This section addresses both the company's logistics management plan and its plan for the utilization of both SBs and SDBs. When discussing SB and SDB utilization, the company must address both its past utilization experience and its proposed utilization. (USACE,SD,RFP, 1993)

5. Volume V: Cost

The contractor includes in this section his anticipated costs associated with the work stated within the RFP. The principal portion of this volume is dedicated to the offeror's cost and pricing data. The following items must be addressed within cost and pricing data: personnel payment rates and schedules; overhead rates; general and administrative (G&A) and other cost markups; forward pricing rate agreements; copies of the offeror's most recently audited financial statements; a certification that the firm's accounting system can handle cost-reimbursable contracts; and a listing of policies and procedures governing personnel, payroll, overtime, and accounting practices. (USACE,SD,RFP, 1993)

6. Volume VI: Sample Project

The company must address its approach and the following plans in its solution to the sample remediation project included in the solicitation: technical and management plan; project work plan; site safety and health plan; chemical data and analysis plan; and finally, anticipated project cost. (USACE,SD,RFP, 1993)

All volumes of the source selection criteria, other than cost, are point scored. Cost is evaluated as to its reasonableness and is used to assist the Corps in determining the level of understanding that a given contractor has of projected work requirements (USACE,SD,RFP, 1993).

When comparing the various evaluation criteria/volumes, the Corps has prioritized them as follows: Volumes I and II are the most important and are of equal value; Volume III is approximately three-quarters the value of the first two volumes each; Volume IV is approximately one-half the value of the first two volumes each; and finally, Volumes V and VI are of equal weight and of less value individually than each of the other volumes. (USACE,SD,RFP,1993)

The source selection evaluation board for the Fort Ord TERC used the same previously-addressed evaluation criteria

to determine the best value contractor. The board had eight proposals to consider in its decision (Lightner, 1995). Ultimately, based upon the evaluation criteria, International Technology Corporation was determined to be the best value offeror.

E. CONTRACT TYPE

Under the TERC concept, each delivery order is negotiated separately. The approved contractual agreements, as dictated in the TERC Management Plan, for delivery orders are either CPAF or CPFF. Fixed-price and time-and-materials contracts are not authorized for use. However, the prime contractor is able to use any type of contract with its subcontractors. In many cases, subcontractors will perform under fixed-price arrangements, which are facilitated by the definition of their performance tasks.

All delivery orders for the Sacramento TERC are CPFF arrangements. This arrangement has been used by the Corps based on the uncertainties associated with the tasks to be performed within the delivery orders. The uncertainties make it difficult to establish target incentives that the contractor can achieve, because ultimately, the incentive

arrangement may not adequately reflect the quality of the contractor's performance. (LMI, 1994)

The CPFF arrangement pays the contractor a fee that is fixed and negotiated at the initiation of the delivery order, in addition to allowable costs incurred (costs that are reasonable, allocable, and those negotiated for the delivery order). The fee does not change with the cost of the work that is delivered/performed, rather, it remains constant throughout performance. The fee amount may only change if the scope of work required under the delivery order changes. Under the CPFF arrangement, the fee can not exceed 10 percent of the agreed upon cost estimate that resulted from negotiations (FAR pt.15, 1995).

It must be understood that cost-reimbursement contracts are based on a level of effort. Therefore, if the contractor does not perform the tasks required in the delivery order within the cost estimate, the contractor is still entitled all of his fee, and the Government has two options: 1. Stop work; 2. Make more funds available to continue performance without an increase in fee. Under the TERC, the Corps has two modes of executing CPFF delivery orders: the completion form and the term form. Of the two forms, the Sacramento TERC uses the completion form which is preferred since,

...it requires that a firmer obligation be assumed by the contractor. Whenever the work, or specific milestones for the work, can be defined well enough to permit the development of estimates within which a contractor can be expected to complete the work, then the completion form is most appropriate (LMI, 1994).

1. Completion Form

a. This form uses a scope of work that sets forth a definite goal or target and specifies an end product (e.g., a final report). A contractor is normally required to complete and deliver the specified end product within the estimated cost, if possible, as a condition for receiving the entire fixed-fee. (LMI, 1994)

b. In the event the work cannot be completed within the estimated cost, the Government may require more effort, without an increase in fee, provided it increases the estimated cost. (LMI, 1994)

2. Term Form

a. This form, frequently referred to as a "level-of-effort," uses a scope-of-work that obligates a contractor to devote a specified level of effort for a stated period of time. If performance is considered satisfactory, the fixed-fee is payable at the expiration of the agreed to period,

upon the contractor's certification that the specified effort has been expended in performing the work. (LMI, 1994)

b. Any renewal for a further period of performance is a new procurement that would involve a new contract (including its estimated cost and fee). (LMI, 1994)

F. CONTRACT ADMINISTRATION

1. Management Plan

Once a TERC has been awarded to a prime contractor, the contractor is required to prepare a detailed management plan. The plan is developed based upon the guidance given by the TERC's administering district. The management plan must include: "a work plan that reflects costs and schedules; health, safety, and environmental protection; staffing numbers and qualifications; information systems and reports; and a plan for exercising quality control." (USACE, 1993). The Corps is responsible for assisting the contractor in the development of the management plan. It should employ the district's current administrative standard operating procedures into the plan in order to minimize the development of new and special procedures just for the TERC.

2. Work Plan Development

For each delivery order exercised by the Corps under the TERC, the contractor must prepare a work plan that responds in detail to the Corps' directed statement of work (SOW). The work plan must address: a proposed schedule that differentiates the time requirements for each task within the SOW, interrelationships between tasks, and a critical path; site control measures; required permits and licenses; a site description and contaminate characterization; key personnel, who will be used on the project and their responsibilities; and deliverables that will be performed within the delivery order (USACE,SD,RFP, 1993).

Prior to the contractor's execution of the work plan, the plan must be approved by the administering district. The standard timeline from the contractor's receipt of the delivery order through the approval of a final work plan, is five weeks. The five-week time period includes: preparation, review and modification, and finally, approval. The contractor can not execute activities under the work plan until it is approved. (USACE,SD,RFP, 1993)

Within each delivery order work plan is a breakout of specific projects which are controlled by work allocation documents. The work allocation documents (WAD) reflect the

specific detailed plans that cover how a given remediation project will be performed. The WAD plans must address how compliance with applicable regulatory requirements will be met. In the case of Fort Ord, the WAD projects are reviewed by regulatory agencies to ensure that both the project's method of achieving the end-state of a clean site, and its standards for the end-state, meet established regulatory requirements. (McMindes, 1995)

3. On-Site Management

The administration of a TERC is performed on-site by the Corps' resident engineer who is responsible for the management, coordination, and reporting of all remedial actions on-site. The resident engineer is responsible for keeping both the TERC PM and the site technical manager informed concerning the current status of the projects.

Since the TERC projects are based on cost-reimbursement agreements, the resident engineer and the quality inspectors have the added responsibility of monitoring a contractor's costs, schedule compliance, and performance. Traditionally, under fixed-price type contracts, the resident engineer and his staff simply had to ensure that the contractor was in compliance with the minimum standards of a project. In order to monitor the contractor's performance under a

cost-type contract, the resident engineer and his staff must work closely with the contractor. (USACE, 1993)

4. Partnering

The use of the TERC method requires a partnering arrangement between the Corps' representatives, the respective prime contractor's representatives, and the customer representative. The partnering is enhanced and stabilized by the TERC and its requirements. One such requirement is a management plan for the contractor which is jointly developed. Members who are functional representatives of both the contractor's and the Corps' respective teams assist in the development process. Without partnering, two of the TERC's most critical aspects, project concurrency and project flexibility, can not be achieved. Partnering assists in the clear definition and interpretation of requirements, and subsequently, the development of methods of monitoring and evaluating the completion of requirements.

G. THE APPLICATION OF REMEDIATION CONTRACTING LESSONS-LEARNED

The TERC is a product of lessons-learned throughout the Corps' experience with remediation contracting. This method evolved principally as a result of contracting inefficiencies that caused both cost and schedule growth. The Corps' use of fixed-price contracts for remedial efforts, despite the effort's complexity, lead in many cases to the effort experiencing either cost or schedule growth, or both. Cost and schedule inefficiencies have also been associated with the use of multiple contractors to accomplish remedial efforts in accordance with an inflexible sequence of remedial steps.

Since the TERC's inception, the Corps is continually applying the lessons-learned from each previously-awarded TERC. At this point in time, there are only acquisition planning, request for proposals, source selection, and Government and contract management plans, lessons-learned available to be applied. There are few, if any, contract administration lessons-learned to date, because the TERC method is so new and execution is only beginning at most sites. The Sacramento TERC was only the sixth TERC to be awarded since the method's approval for use. As the TERC

reaches a point where it is a more mature process, lessons-learned regarding contract administration will have to be applied to future projects.

To date, the Corps is dictating to its districts approved for TERC use, what the current standard is for the RFP, the source selection documentation process, and the management plan. The Savannah District is currently the standard bearer for the RFP. The Sacramento TERC was the RFP standard bearer at the time of solicitation, however, since then two others have been awarded, one by the Alaska District and the other by the Savannah District. Each has improved on the last RFP issued for a TERC, and each successively became the Corps' standard for the RFP. The Sacramento district's method of documenting the source selection process is still considered by the Corps to be the best, and the PARC has directed that other districts apply the basic format used by Sacramento. (Lightner, 1995) The Corps' Management Plan as written remains the standard by which each TERC-authorized district is to write its own management plan.

H. SUMMARY

The TERC is a comprehensive contractual arrangement for HTRW remediation efforts that are not well-defined and represent considerable performance risk. The TERC method overtly attempts to control the cost, schedule, technical, and performance risks associated with complex HTRW projects. Some of the risk control methods addressed in this chapter included: the use of a CPFF arrangement for delivery orders; subcontractor bonding; regulatory compliance via WAD approval; and the Corps on-site representatives who administer the contract.

IV. ANALYSIS

A. GENERAL

Risk mitigation and management is an ongoing process throughout the life-cycle of any project or program. The study of risk mitigation and management efforts applied within the TERC method lends itself to an analysis by phase of implementation. The analysis within this chapter is directed towards issues that are important to risk mitigation and management efforts.

The analysis portion of this thesis discusses risk mitigation efforts taken or not taken by the Corps in its application of the TERC method. The analysis is divided into three sections: pre-award risk mitigation, risk mitigation in the solicitation and award phases, and risk mitigation in the contract administration phase.

A. PRE-AWARD RISK MITIGATION

1. Consistency in Application

The TERC method is a well conceived and applied contracting method. The strength of the TERC and the Corps' application of it rests in the fact that this contracting

technique is not designed to be the "silver bullet" method to encompass all HTRW remediation efforts. The Corps has carefully delineated the uses for which this contracting method is applicable, and it does not rule out other methods as appropriate in certain situations.

The Corps has detailed, strict guidelines for the application of the TERC which prevents any dilution of its intended use. These guidelines include both, the eight screening criteria which may lead to a site's nomination for remediation under a TERC, and the echeloned TERC approval process. Through the application of the tiered constraints placed on TERC usage, addressed in chapter III of this thesis, the Corps continually reinforces its intent for the use of the TERC method.

An additional critical point relating to the approval process is the requirement for the district administering the proposed TERC to have key personnel associated with TERC project management trained in TERC application. The Corps takes this requirement seriously and has contracted with the Logistics Management Institute (LMI) to conduct all TERC training. The LMI training covers the following aspects of the TERC: HTRW remediation contracting background which led to the development of the TERC process, the standard TERC RFP and its content, the principles of cost-reimbursement

contracting and the use of delivery orders, and TERC proposal evaluation and source selection. LMI's training also ensures that the Corps is trained in a consistent manner to prevent the misuse of the TERC contracting method.

The TERC is governed by a generic Corps acquisition plan. Each district's individual acquisition plan must conform to the Corps' plan and be modified only to meet the particular idiosyncrasies of that given district.

Consistent with the tight controls placed on the TERC method is the use of a standard RFP for TERC solicitations. The RFP is only modified between each new TERC solicitation and the last one, to incorporate the tailoring required to meet the new stated requirements for the given remediation sites or to incorporate lessons-learned from previously issued solicitations. The lessons-learned changes are recommended by the Corps to each prospective issuing district.

2. TERC Benefits

The TERC method of using a single contractor for all six phases of the remediation process promotes: cost and schedule savings, via a single point of contact for all work; the ability to perform work on different projects

concurrently; contractor knowledge retention; and the requirement for only one solicitation.

If the contract were performed under more traditional methods of HTRW contracting, where individual projects were contracted separately and for only certain phases of the six-step process, the Government would incur both a significant growth in costs and in the schedule required to perform the requirements of the group of projects. The TERC method allows the Government to save a significant amount of money and time relating to the solicitation process alone. For example, there are eight distinct remediation projects within the Fort Ord delivery order. If these projects were separated individually and contracted for under traditional contracting methods, the Government would incur the cost of no less than 16 separate solicitations, because each project would be broken down to at least a design contract and a construction contract. The Corps would also incur a comparable growth in the procurement process and contract execution schedule that would be solely attributable to the time required to solicit and award 16 individual contracts.

A single prime contractor for all phases of the remediation effort promotes knowledge retention throughout the project's lifecycle and reduces the potential for either schedule and/or cost growth, associated with changing a

contractor between performance phases. The single contractor approach eliminates the additional time that would be required for a second contractor to learn the same lessons (those already learned by the preceding contractor) all over again, as well as the additional costs associated with that learning process. Additionally, the Government avoids the cost and schedule growth that may occur as the second contractor comes on board and defines the site conditions differently than its predecessor. The Corps performed a study that demonstrates the schedule savings alone that can be achieved by using the TERC. The study was based on the work allocation document at Fort Ord for the water pumping and treatment plant. The study found that under traditional contracting methods the performance of work, from the time of the record of decision through the time at which the project demonstrated effectiveness, would have taken 21 months. Under the TERC, the same project was determined to require only 15 months to demonstrate effectiveness, thus providing a six-month schedule savings on only one project of many. (Lightner, 1995)

A single contractor for all phases of all projects provides the Government with a narrowed focus and a single point of contact. The single point of contact allows the Corps' residency offices and their respective managing

districts to focus on a single contractual document and a single contractor. Thus, the Corps' oversight ability is not diluted through the administration of multiple contracts and contractors. An effort within a project that may have been performed under its own contract, using a traditional contracting method, may now be performed by a subcontractor to the prime-contractor who is responsible for the sub's performance rather than the Government.

Finally, while a single contractor for all phases and projects does not promote concurrency any better than having multiple contracts being performed at the same time, it does promote efficiency. A single point of contact with total responsibility for all projects is better able to use resources, particularly money and time, more efficiently.

An issue that the Corps and its district offices must guard against is the potential for a conflict of interest stemming from the contractor's complete oversight of the process. Principally, they must guard against a design effort that is beyond that which is required and the accompanying construction effort required by design which would increase total costs to the Government. The Corps employs two principal methods to control the potential for a conflict of interest. First, the Corps employs its own design engineers who review the contractor's designs to

ensure that they comply and do not exceed the scope of the design guidance provided by the Corps. Second, under the TERC, the Corps employs a cost-reimbursable contract for each work order. Thus the fee, whether fixed, award, or incentive, is associated with an initial cost estimate proposed by the contractor and not his total costs ultimately incurred. Therefore, the contractor has no incentive to over-design and increase the amount of work required because it will not result in an increased fee.

3. Contracting for Unexploded Ordnance (UXO) Remediation

While the intent of the TERC is to combine all projects at a given site under a single cost-reimbursable contract, this is yet to be completely realized with the remediation of Fort Ord. The TERC issued by the Sacramento district neither includes within the Fort Ord delivery order a work allocation document for the remediation of UXO in the main impact area, nor is the prime-contractor certified as an UXO contractor. The center of excellence within the Corps for dealing with UXO is based at the Corps' Huntsville Division. The Huntsville Division retains the right to award all UXO remediation contracts. This apparently parochial approach

by the Huntsville Division results in an inefficient manner of doing business and is contrary to the consolidated effort intended by the TERC method.

The IT Corporation, the prime contractor, has the ability to deal with UXO and perform remediation efforts associated with the impact area on Fort Ord. However, they have not been certified by the center of excellence. The Sacramento office has been active in attempting to get IT UXO certified. (Lightner, 1995) Under the current situation, an interim solution has been proposed. The solution would provide a separate cost- reimbursable contract to the Sacramento district for its management, but the contract will be solicited and awarded by the Huntsville Division (Lightner, 1995). However, until such a contract is in place, any UXO that is unexpectedly encountered at any work site will cause a shutdown of operations until the UXO can be cleared by a certified contractor or an Army Explosive Ordnance Detachment.

Ideally, the impact area on Fort Ord which contains UXO should have been awarded in the Fort Ord delivery order as its own work allocation document. The current solution dilutes the benefits, previously addressed, that could otherwise be achieved by using a single contractor and contractual vehicle for all cost-reimbursable projects.

While the proposed contractual arrangement for the remediation of the impact area does not explicitly increase any particular risk category, it allows for neither the effective nor the efficient use of both money and time.

B. RISK MITIGATION IN THE SOLICITATION AND AWARD PHASES

1. The Sample Project Required by the RFP

The sample project is a unique vehicle within each offeror's proposal that allows the Corps to assess a given contractor's understanding of the contractual, technical, administrative, and cost requirements associated with a given situation. The sample project is one of the items that is tailored within each new TERC RFP, and includes remediation tasks that are representative of the situations that will be encountered by the awardee once selected. For example, the Sacramento TERC's sample project represented situations as they existed on Fort Ord.

The sample project plays a critical role in the contract award because it enables the Corps to evaluate, in a subjective manner, each offeror's approach to an HTRW situation. The Corps' source selection board compares a contractor's sample project solution to the way it proposes

to do business in the rest of its proposal, to determine if there is consistency between the two. Accordingly, the Corps is able to evaluate the offeror's approach to the stated requirements. The Corps can then evaluate the technical approach to determine if it meets the needs of the requirement and whether or not it is an innovative or proven method of meeting the needs. The sample project also provides the Corps an insight into the cost estimates and realism of the offeror's approach.

Given that the sample project is tailored to each new TERC solicitation, there is not a "school solution" available that could be reused or improved upon for each subsequent TERC solicitation. The Corps mitigates its risk of selecting a contractor that does not understand the depth of effort and intricacies associated with HTRW contracting by using the sample project as an evaluation criterion in the source selection process.

2. Using a Single Delivery Order per Remediation Site

Under the TERC method, a delivery order can be established per project or per site. The Sacramento TERC uses a delivery order per site and each project is subsequently delineated as a work allocation document. The

use of a single delivery order per site promotes efficiency in both contract administration and contract closeout.

The single delivery order allows both the Government and the contractor to work within the budget of one contractual agreement that has several projects versus a budget per contract. Thus, cost overages on one project can be counter-balanced by a savings from another project or work allocation document and the project does not have to be rebaselined. The single delivery order still requires contract cost and budget management, but to a lesser degree than a delivery order per remediation project.

A single delivery order also promotes speed in contract closeout. The Government has traditionally encountered long delays in closing contracts, whether they were for small procurements or billion dollar weapon systems. A single delivery order for multiple projects facilitates closure better than multiple delivery orders. With the single delivery order, all work must be accomplished prior to its closure. Therefore, when the work associated with the site is complete, there is no reason for the delivery order to remain open.

Multiple delivery orders per remediation site would delay contract closeout by both the contractor and the Government, since each would be more preoccupied with the

work yet to be done on the site in accordance with the requirements of delivery orders that remain open. For example, if each project work allocation document for Fort Ord were its own delivery order, there would be eight separate delivery orders to administer and ultimately closeout for the Fort Ord portion of the TERC. All of the respective delivery orders would have to be closed out prior to the final overall TERC closeout.

C. RISK MITIGATION EFFORTS IN THE CONTRACT ADMINISTRATION PHASE

1. Remediation Design Approval

Once the Corps receives an investigative report that identifies the types and suspected quantities of HTRW contaminants on a given project site, it begins an involved decision-making process. The process leads to the ultimate design that will render a clean site in accordance with regulatory requirements.

The critical risk mitigating aspect of work plan development is that the Corps does not expressly detail, as in a design specification, how the contractor is to perform the desired remediation. The Corps only provides the

contractor with a scope of work to be performed and its proposed method of remediation. This lack of specificity, particularly in the method of performance, allows the contractor to develop a remediation work plan that may well be more innovative and/or efficient than a manner that might have been prescribed by the Corps' design engineers. The Corps reviews the contractor's proposed work plan along with state and Federal regulators (if they choose to be involved in the work plan process). The review process ensures that the proposed methods meet the stated regulatory requirements and that the work plan is efficient and guards the Government's best interests. Therefore, the contractor has two goals: to ensure the plan meets regulatory requirements, and that the plan provides the best solution within the Government's means.

The Corps mitigates project risks by involving the Federal and state regulatory agencies in the work plan design process as early as possible through design approval. This involvement insures that requirements are met on the front-end of project planning, rather than after the project has been executed. The up-front planning and involvement eliminates cost and schedule growth that might otherwise be expected if the work plan were not validated until later in the process.

The first work order allocation document on Fort Ord for a ground water remediation pumping and treatment plant demonstrated the effectiveness of the Corps' loose design specifications and the early-on involvement by the regulators. The Corps, in its direction to the contractor, stated that it considered a remediation process that involved both filtering and ultraviolet treatment of contaminated water to be the preferred method. While the contractor complied with the method of choice, it evolved the standard filter and ultraviolet treatment procedure into a more innovative approach which achieved the desired results through a more efficient process and at a lower cost to the Government. Since the applicable regulatory agencies were involved in the design process review from the beginning, the contractor was able to prove its innovative design early on and receive regulatory approval to enter into construction. (McMindes, 1995)

The Sacramento TERC is fortunate to benefit from the early involvement of Federal and state regulators in the design process of any remediation project. This is not the case for all Corps district offices, however. For example, the Missouri River District has been unable to get the Colorado state regulators involved in the design approval

process for any applicable TERC remediation actions (Haskell, 1995).

2. Partnering

Partnering is a critical aspect of the TERC method that the Sacramento District takes seriously. The team that is ultimately responsible for the transition of Fort Ord's properties consists of more than just the contractor and the Corps. Also included in the team is the customer who represents the installation's interests, and Federal and state regulators who represent environmental interests.

The Sacramento district has aggressively pursued a partnering relationship with both the customer and the contractor. The regulators, while not a part of the immediate team, are involved in the design review and approval process along with the other team members. The teaming arrangement focuses on meeting the remediation requirements of the customer in the most effective and efficient manner available.

The Sacramento District has established a strong partnership between the three key players at each of the sites. The partnership strategy was established at a partnering conference held on 3 August 1995, in Monterey, California. The strategy has since been put into a standard

operating procedure format which directs a monthly team assessment of the strengths and weaknesses that the team has identified. The partnering activity and strategy is not only applied at the site level, but also at the program management level, where the Corps and contractor must work hand in hand. The partnering assessment of each site team, and that of the program management team, is openly discussed at monthly program review sessions. This open discussion allows for the successes and failures of each team to be studied and turned into lessons-learned for the program in general. Therefore, it enhances efficiency by capitalizing on recognized successes and identifying stumbling blocks so that they are not repeated.

Ownership of the partnering program is critical to its success. The Sacramento District's approach facilitates ownership by naming specific key individuals who represent each of the partners as champions of the program. Therefore, the partnering program receives focused support and is not just a nebulous responsibility directed to each site in general.

A partnership, in order to be effective, requires trust and openness, productive communications, informed decision-making, and a problem resolution process between team members in order to be effective. The partnering

relationship between the Corps, customer, and contractor, has all of these aspects, in addition to commitment. This is not to say that there is either a less than arms-length relationship between the customer and the contractor, or the Corps and the contractor. The partnering relationship and program instituted by the Sacramento District enhances a program focus that is jointly understood.

Some successes already experienced at Fort Ord can be attributed to the partnering relationship between process participants. For example, the success relating to the water pumping and treatment facility, noted early in this section, is partially attributable to the partnering relationship established between the contractor, the Corps, and the regulators. Additionally, the Corps is anticipating a multi-million dollar savings at another remediation site on Fort Ord. This savings can be traced back to both the partnering process and changing site conditions. (McMindes, 1995)

3. Cost Contract Administration Training

Training on the TERC's applicability of use and its procedures for use is a cornerstone that is required to be in place prior to any district receiving the authority to use the TERC method. This training, as previously

addressed, is conducted by LMI; however, the training is designed to support those individuals at the TERC's second-tier, the program management level. The Corps does not provide any training to its first-tier, the residency offices, on the TERC method of contracting or on administrative procedures required when over-seeing a cost-reimbursable contract.

Traditionally, the Corps' contracts, whether for remediation efforts or for normal design and construction efforts, have been performed under fixed-price type contracts. Therefore, field representatives at the Corps' residency offices have been principally concerned with quality control. The field representatives in the residency offices have not been trained to administer cost-reimbursable contracts. They are neither knowledgeable in cost control, nor in evaluating a contractor's performance in relationship to its work plan.

The dramatic shift from a fixed-price type of contract to a cost-reimbursement contract such as the TERC, requires training for the Corps' representatives at residency office level. Under the current situation, the program manager for the Sacramento TERC conducts cost review sessions at each of his four major remediation sites every two weeks, thus consuming eight individual work days or portions of them.

The program manager's schedule could be reduced to monthly and by-exception cost meetings if field representatives were adequately trained to administer cost-type contracts.

Currently, the only TERC training the residency offices within the Sacramento District receive is a one-day class. The class familiarizes the representatives with the district's TERC standard operating procedures and with specific TERC related procedures, and it details the roles and responsibilities of individuals involved with the TERC.

The Corps in general has increased its risk of cost and schedule growth in TERC projects by not having its on-site administrators in the residency offices trained to conduct contract administration tasks associated with cost-type contracts. Also, the Corps has limited its ability to use other cost-type contracts, principally the CPAF arrangement. The CPAF requires that those who are performing administration be informed of contract administrative procedures so that they are able to render qualitative analysis to the program manager prior to award fee determination. Contract administration is a routine mission performed by the Defense Contract Management Command (DCMC) for DoD's major buying commands. In support of this mission both the Army and Navy have existing contracting officer representative classes. The Corps has failed to take

advantage of the established contract administration knowledge base outside its own command.

Currently, the Corps is in the process of establishing a standardized two-day TERC-specific class that will train representatives in the Corps' residency offices on the fundamentals of administering cost-type contracts. While it is better late than never, the Corps should seek to provide this training to those residency offices who are already administering TERCs at the earliest possible time. As soon as the Corps provides the training to its field representatives who are already administering TERC contracts, it would mitigate undue cost and schedule growth risk brought on itself.

E. SUMMARY

This analysis has highlighted some of the critical risk mitigation and management efforts that the Corps either already performs or could perform in its implementation of the TERC contracting method. The Corps' application of the TERC method successfully applies risk mitigation and risk management efforts throughout the life-cycle of the contract.

V. CONCLUSIONS AND RECOMMENDATIONS

A. ANSWERS TO RESEARCH QUESTIONS

1. **Primary Question:** What efforts have been taken by the U.S. Army Corps of Engineers, Sacramento District, to mitigate the contracting risks associated with environmental restoration and hazardous waste disposal, for the environmental cleanup of Fort Ord, California?

The Sacramento District of the Corps has recognized that risk mitigation is a continual process that must be exercised throughout the lifecycle of the remediation project. The Sacramento District has selected to use the TERC method as its primary means of contracting for the remediation effort associated with Fort Ord. This method of contracting, as with all other contracting methods, facilitates the mitigation of cost, schedule, performance and technical risks via: the source selection process, the actual contract type selected, quality assurance, and program reviews.

The use of the TERC for the remediation effort has also demonstrated risk mitigating efforts beyond those that are common to most contracts. The TERC method, coupled with the

Sacramento District's implementation of it, further mitigates potential risks via: the TERC's strict project screening and approval processes for use; the use of a single contractor for all remediation phases and projects; the requirement that each offeror complete a sample remediation project; the use of a single delivery order per site; the implementation of an aggressive partnering program; and the early involvement of both Federal and state regulators in the remediation design process.

2. Subsidiary Question 1: How were lessons-learned from previous efforts incorporated into the TERC?

The TERC method has evolved as a result of lessons-learned from previous contracting methods that proved themselves to be either ineffective or inefficient for large-scale, complex remediation efforts. The TERC method has been continually revised as the Corps identifies strengths and weaknesses in the performance and administration of each new TERC solicitation. With each change to the TERC process, the Corps directs its subordinate districts to model their next generation of TERCs after the latest revision of the standardized solicitation and procedures.

3. Subsidiary Question 2: What are the critical Federal, California, and Monterey County environmental laws that apply to the restoration of Fort Ord?

These laws are discussed in detail in Chapter II of this thesis. The critical Federal environmental laws include: the Comprehensive Environmental Response and Liability Act (CERCLA) and its two subsequent amendments, the Superfund Amendments and Reauthorization Act (SARA) and the Superfund Reform Act; the Resources Conservation and Recovery Act (RCRA); the Federal Facilities Compliance Act (FFCA); the National Environmental Policy Act (NEPA); and the Community Environmental Response Facilitation Act (CERFA).

Critical California environmental laws include: the Hazardous Waste Control Act (HCWA) of the California Health and Safety Code; AB 2948-Hazardous Waste: Management Plans and Facility Siting Law, Title 22, Division 4, Chapter 30 of the California Code of Regulations (CCR); and Title 23, Chapters 3 and 16 of the CCR. Monterey County environmental laws are subordinate to both the Federal and state laws and do not represent an additional compliance burden to the restoration process.

4. Subsidiary Question 3: What is the Corps' plan for administering the restoration of Fort Ord?

The eight individual remediation projects to be performed on Fort Ord are grouped under one delivery order. The oversight of the contractor's performance of the delivery order's requirements is being administered by Corps representatives who work out of an on-site residency office. Program administration is performed by the program manager and the contract administrator who are located in Sacramento.

B. CONCLUSIONS

1. General

Risk mitigation is an on-going process throughout the lifecycle of any project, including the TERC. Cost, schedule, technical, and performance risks are mitigated in all contractual agreements, including the TERC, via the source selection process, the actual contract type selected, quality assurance efforts, and program reviews. In addition to these risk mitigating techniques, both the TERC method of contracting, and initiatives taken by both the Corps and the

Sacramento District of the Corps, have enabled further risk mitigation to be performed in the restoration of Fort Ord.

2. Risk Mitigation Efforts Facilitated by the Corps

The TERC method of contracting is used because of its additional risk mitigating qualities. Prior to its selection for use, the potential remediation project is thoroughly screened to ensure that it is a valid candidate for the TERC. Both the screening process and the tiered approval process for use, ensure that the best contractual vehicle is being employed by the Corps. The risk is further controlled within the TERC via the Corps' demand for standardized application, and its means to ensure standardization.

Although the TERC method has demonstrated successes, due to the method's relative immaturity, the Corps has sought continually to improve the method itself. The Corps has incorporated the contracting lessons-learned from each previously issued TERC into each future generation of TERCs to be awarded. Thus, the TERC method's efficiency and effectiveness is improved as a result of identified successes and failures.

The TERC method enables the Government to realize cost and schedule savings up-front in the contracting process,

during the solicitation and award phases. The single contract of the TERC provides the Corps with one full-service contract for every remediation project versus traditional contracting methods which would provide for two contracts (design and construction) per project. Significant cost and schedule savings in the solicitation process alone will be realized by the Government as a result of TERC usage.

In the RFP, the Corps requests offerors to perform a sample project that represents remediation conditions that may exist on the actual sites at which remediation efforts are required. Each offeror's project provides the Corps with unique insight into the respective offeror's understanding of the requirements of the situation, its unique approach to the remediation at hand, and the cost-realism of the proposal. The exercise is used as an indicator by the Corps to identify where they may or may not be accepting risk with each offeror.

The Sacramento District uses only one delivery order per remediation site versus one delivery order per project on each site. This effort facilitates contract administration since all the work at one site can be coordinated through one contractor point of contact using the same requirements instead of multiple persons working

from different contracting instruments. Also, the single delivery order facilitates contract closeout. By the use of a single delivery order, neither the contractor nor the Government are distracted by continuing efforts under other delivery orders once each project is complete. Under the single delivery order concept, once all projects are completed no continued performance is required and the delivery order can be closed.

The Corps delineates remediation project requirements in a manner similar to a performance specification, where the contractor is told what must be performed, not how to perform. This type of specification allows the contractor the flexibility to develop the best-value alternative for the Government and the Government to take advantage of the contractor's innovation. Coupled with the advantages of a performance-based specification, is the involvement of both Federal and State regulators in the design development process. Regulator involvement, early on and throughout the design and construction process, ensures that environmental legal requirements are met. Therefore, the Corps reduces its risk of potential cost and schedule overruns that could otherwise be expected if the regulatory checks were performed after the project was constructed.

The Sacramento District of the Corps has established a sound partnering relationship with the customer (Fort Ord), the contractor (IT Corporation), and the Federal and state regulators. The Corps is committed, as are the other team members, to the partnering relationship. The basic element of trust, particularly between the Corps and IT Corporation, has resulted in effective communication and demonstrated cost and schedule savings.

3. Required Improvements

Despite the Corps training requirement for TERC administering districts, the training program is inadequate and must be improved. The existing training is focused at the second-echelon or program management level of the TERC. However, the personnel in Corps residency offices represent the first-echelon or contracting officer representative level, who do not receive adequate training to meet the Corps' needs for effective contract management. The residency office personnel have not been trained to administer cost-reimbursable contracts; therefore, the Corps is increasing its risk of cost and schedule overruns. Performance risk is not necessarily increased for the Corps since the residency office's personnel are accustomed to

contractor performance assessments in the form of quality control.

The TERC method is designed to enhance contract efficiency by incorporating all projects that are suitable for cost-reimbursable agreements under the same contractual umbrella. However, in the case of Fort Ord, the main impact area which includes UXO has not been included in the contract. This failure to include the impact area's remediation under the TERC and to obtain UXO disposal certification for the IT Corporation, defeats the TERC's efficiency principle.

C. RECOMMENDATIONS

1. The TERC method represents a new and innovative method of remediation contracting and should continue to be used and investigated for adoption by both the EPA and the Department of the Navy. In order to improve the method, the Corps must continue its evolutionary process of incorporating lessons-learned from previously executed TERCs into future generations of TERCs.

2. The Corps must implement a contracting officer's representative (COR) training program for its residency

office personnel. The program should be standardized to ensure that the Corps' ideals regarding the TERC method are met. The Corps has the opportunity to use existing three-day COR courses that are taught by either the Army Logistics Management College at Fort Lee, Virginia, or the Naval Supply Systems Command. However, if the Corps' COR course is ready on schedule, in January 1996, then the Corps should wait for its own specific COR training rather than employ generic COR training. Additionally, once the Corps' COR training is established, residency office representatives who are already in the process of administering TERCs should be given first priority to receive the training.

3. The Corps must guard against defeating one of the principal objectives of the TERC, efficiency. The Corps in its site specific acquisition planning of remediation projects, e.g. Fort Ord, must ensure that all appropriate projects are included within the TERC. In order to achieve this, and avoid the exclusion of any project, e.g. the Fort Ord's impact area, the Corps must plan for contractor certification to meet all remediation needs and eliminate apparent parochial barriers to contract efficiency.

D. FURTHER RESEARCH

The Total Environmental Restoration Contract (TERC) provides the Corps of Engineers with an innovative and flexible method of contracting for the remediation of HTRW sites that are suitable for cost-reimbursable contracts. Within DoD, both the Army and the Air Force use this method to perform remediation contracting for large and technically challenging remediation sites. However, the Navy Facilities Engineering Command does not use the TERC method for similar situations.

This thesis has been limited to the TERC that covers the remediation of Fort Ord as issued by the Sacramento District of the U.S. Army Corps of Engineers. However, other areas of interest regarding HTRW remediation contracting have arisen. Suggestions for future research in the field of HTRW contracting include:

1. What differences exist between the methods of contracting for environmental remediation of HTRW substances between the Army Corps of Engineers and the Naval Facilities Engineering Command?

2. An analysis and determination of whether the bonding requirements stipulated in the Federal Acquisition

Regulation (FAR) meet the needs of environmental restoration contracting.

3. A comparative analysis of the Environmental Protection Agency's, the Naval Facilities Engineering Command's, and the Army Corps of Engineers' methods of contracting for large and technically-challenging HTRW remediation projects which are ideally suited for cost-reimbursable contracts.

LIST OF REFERENCES

Army Federal Acquisition Regulation Supplement (AFARS), Part 15, October 1994.

Army Federal Acquisition Regulation Supplement (AFARS), Manual No. 1, "Formal Source Selection Procedures for Army Systems Acquisition", March 1991.

Babchyk, B., Risk Allocation in Construction Contracting, Master's Thesis, University of Florida, Fall 1992.

Banaji, D., Contacting Methods and Management Systems of Remedial Action Contracts within the U.S. Navy's Installation Restoration Program, Master's Thesis, Massachusetts Institute of Technology, September, 1993.

Bowen, B. and Reid, T., Selecting Contract Types, 2nd ed., The National Contract Management Association, 1990.

California Environmental Laws, 1993 Edition, St. Paul, MN.: West Publishing Co., 1993.

Defense Federal Acquisition Regulation Supplement (DFARS), Part 215, May 1991.

Defense Logistics Studies Information Exchange (DLSIE).

Defense Systems Management College (DSMC), Risk Management, Concepts and Guidance, p.3-1, Washington, D.C.: U.S. Government Printing Office, May 1989.

Federal Acquisition Regulation (FAR), Part 15,16, 28 and 36, January 1995.

Federal Environmental Laws, 1992 Edition, St. Paul, MN.: West Publishing Co., 1992.

Goodman, S. W., "Vision for Environmental Security", Defense '94, Issue 3, pp. 25-39, Washington, D.C.: U.S. Government Printing Office.

Hamer, C. S., Environmental Issues Associated with the Department of Defense Base Realignment and Closure (BRAC) Program, Master's Degree Scholarly Paper, University of Maryland, August 1993.

Haskell, John A., TERC Program Manager, U.S. Army Corps of Engineers, Omaha District, Interview Granted, 26 October 1995.

Headquarters, Army Materiel Command (HQ,AMC), Material Developer's Guide for Pollution Prevention (Draft), Acquisition Pollution Prevention Office, Alexandria, Va., 1994.

Heberling, M. E. and Murphy, D. J., "Contracting for Environmental Remediation", Contract Management, February 1995, pp. 11-16.

Ijames, Ruth Anne, Chief of Contracts Division, U.S. Army Corps of Engineers, Sacramento District, Interviews Granted, 23 January 1995, 8 February 1995, and 21 June 1995.

La Branche, David, Captain, U.S. Army, Lead Inspector, U.S. Army Corps of Engineers, Fort Ord Residency Office, Interview Granted, 19 September 1995.

Lightner, Steve, TERC Program Manager, U.S. Army Corps of Engineers, Sacramento District, Interviews Granted, 3 August 1995, 28 September 1995, and 19 October 1995.

Logistics Management Institute (LMI), Total Environmental Restoration Contracts (TERC) (An Orientation Seminar), U.S. Army Corps of Engineers, Sacramento District, Bethesda, Md.: LMI, January 1994.

Macfarlan, W.G., Briefing to the National Contract Management Association (NCMA), Naval Postgraduate School (NPS) Chapter at NPS: "Total Environmental Restoration Contracts (TERC), U.S. Army Corps of Engineers", 6 April 1995.

McMindes, Daniel, Technical Manager for Fort Ord, U.S. Army Corps of Engineers, Sacramento District, Interview Granted, 28 September 1995.

Naval Center for Acquisition Training (NCAT).

Piper, Jane, TERC Contract Administrator, U.S. Army Corps of Engineers, Sacramento District, Interviews Granted, 3 August 1995 and 28 September 1995.

Smith, C. S., Contracting for Engineering and Design Services in the Environmental Restoration Field, Master's Thesis, Naval Postgraduate School, December 1991.

Stoudt, Louis E., Program Manager, International Technology Corporation, Interview Granted, 1 November 1995.

U.S. Army Corps of Engineers (USACE), Management Plan: Total Environmental Restoration Contracts (TERC), 17 September 1993.

U.S. Army Corps of Engineers, Missouri River Division (USACE,MRD), Acquisition Plan for Total Environmental Contracts, Revision No. 10, 25 January 1993.

U.S. Army Corps of Engineers, Sacramento District (USACE,SD), Request for Proposals: Total Environmental Restoration Contract, RFP NO. DACW05-94-R-0001, 16 December 1993.

U.S. Army Corps of Engineers, Sacramento District (USACE,SD), TERC Management Plan (Including SOPs), 18 January 1995.

U.S. Army, Environmental Office, Cumulative Number of Environmental Laws and Amendments, Washington, D.C., 1994.

U.S. Army, Fort Ord Installation, Environmental Office, Advance: Fort Ord's Environmental Newsletter, Spring 1993.

U.S. Army, Fort Ord Installation, Environmental Office, The Army's Environmental Cleanup at Fort Ord, September 1992.

United States General Accounting Office, A Range of Cost Measuring Risk and Uncertainty in Major Programs--An Aid to Decision Making, Washington, D.C.: U.S. Government Printing Office, February 1978.

United States General Accounting Office, Contract Pricing: DCAA's Methodology Change in Identifying "High Risk" Contractors, Washington, D.C.: U.S. Government Printing Office, June 1992.

United States General Accounting Office, DOE Management: Impediments to Environmental Restoration Management Contracting, Washington, D.C.: U.S. Government Printing Office, August 1992.

United States General Accounting Office, Environmental Cleanup: Observations on Consistency of Reimbursements to DoD Contractors, Washington, D.C.: U.S. Government Printing Office, March 1994.

United States General Accounting Office, Hazardous Waste: EPA Cleanup Requirements- DoD Versus Private Entities, Washington, D.C.: U.S. Government Printing Office, July 1989.

United States General Accounting Office, Hazardous Waste: Improvements Needed in DoD's Contracting System for Disposal of Waste, Washington, D.C.: U.S. Government Printing Office, August 1991.

Youngblood, Gail, Chief, Environmental Management Division, Fort Ord, Interview Granted, 25 November 1994.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center.....2
8725 John J. Kingman Rd., STE 0944
Fort Belvoir, VA 22060-6218
2. Library, Code 13.....2
Naval Postgraduate School
Monterey, CA 93943-5101
3. Defense Logistics Studies Center Information Exchange.....1
U.S Army Logistics Management Center
Fort Lee, VA 23891-6043
4. Acquisition Library.....1
Department of Systems Management
Naval Postgraduate School
Monterey, CA 93942-5103
5. OASA (RDA).....1
ATTN: SARD-ZAC
103 Army Pentagon
Washington, DC 20310
6. Prof. David V. Lamm (Code SM/Lt).....5
Naval Postgraduate School
Monterey, CA 93943-5103
7. Prof. Sandra M. Desbrow (Code SM/Ds).....2
Naval Postgraduate School
Monterey, CA 93943-5103
8. Prof. Dave Matthews (Code SM/Md).....1
Naval Postgraduate School
Monterey, CA 93943-5103
9. LTC John Dillard (Code SM/Dj).....1
Naval Postgraduate School
Monterey, CA 93943-5103
10. Ms. Ruth Anne Ijames.....2
U.S. Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, CA 95814-2922
11. Mr. Dan Mc Mindes.....1
U.S. Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, CA 95814-2922
12. Mr. W. Gregor Macfarlan1
Logistics Management Institute
2000 Corporate Ridge
McLean, VA 22102-7805

13. CPT Robert W. Schumitz..... 10
1 Lakewood Place
Port Monmouth, NJ 07758